How can surfing help the environment? My Final Project explores the power of the surfing community's efforts to protect the oceans we love. I researched the effects of climate change on the ocean and the environmentally harmful byproducts that are released into the atmosphere by modern surfboard construction. It seems uncharacteristic that a sport whose culture emphasizes environmental consciousness would rely primarily on environmentally unfriendly boards; therefore, I researched alternative foam and wood solutions to find out how surfing might return to its eco-friendly past without losing its technological progress.

This redwood surfboard was made using a minimal amount of unnatural chemicals; the emblem is burnt into the wood and the board itself is sealed with beeswax. The design of the emblem was inspired by saws used to cut the redwood for the first surfboards made in Santa Cruz, California, and by abstract depictions of waves. I chose to make a surfboard because I believe it shows how individual surfers can begin to help the world on a personal level. Not everyone has the time or the interest to work with charities or foundations, but riding eco-friendly boards is an easy way to benefit surfing and the ocean.

Ultimately, my work is meant to create an argument for surfing's ability to go green. On a personal level, I love to surf and have always wanted to build my own board. Over the course of the project, I have gained a better understanding of board mechanics, waves, the ocean, and surf culture. I hope it can serve as an example of an eco-friendly surfboard. Most of all, I just want to surf it.

Graham

I began surfing when I was about eleven years old, but it was hardly my first encounter with the ocean. My entire life has been spent in San Francisco, with beaches only a short drive away in three directions. I've always loved the ocean and to this day find it difficult to spend any considerable amount of time in a landlocked area. For me, surfing is a fulfillment of all my desires; creating feelings of connection, euphoria, adrenaline and admiration for the power of the ocean. Surfing is both an escape from reality and a means for me to express myself.

Surfing is undeniably dependent on the surrounding environment. No surfer in the water can help but notice the power of the ocean, its tendency to seemingly change on a whim and its connection to the rest of the world. Small changes can have enormous consequences that affect the entire system: Fish, algae, coral reefs, weather, waves, surfers, etc. For surfers, changes in the ocean have direct consequences on the waves we ride. Waves are created by winds far offshore and then are affected by every aspect of the world until they reach the shore. Their height is determined by wind speed and duration as well as fetch, the distance the wind blows over water in one direction (NOAA, 2008). Ocean depth, other winds, temperature, reef and sea floor shape all change the way a wave will break. As such, it is important to surfers that the ocean be protected. Although the act of surfing itself doesn't help the environment, its practitioners and the culture surrounding it are deeply entwined with environmental conservation and other issues. The goal of my project is to determine how surfing can be beneficial to the ocean it relies on, and the rest of the world. In doing so, I hope to find out how recreation and conservation can coexist; how climate change directly affects waves and the ocean; and how surfing can go green. I believe surfers are, and can continue to be, a powerful force for good in our environment. It is often true that people rely on the ocean's resources for money and survival. Commercial fishermen may love to fish, but it's certainly not a hobby and is destructive to fish populations. Oil companies drilling into the ocean floor have no interest in mind other than cash flowing right along with the oil. Surfers, on the other hand, benefit from enjoyment of the waves. It is in our best interest to support conservation efforts that protect the ocean and waves. In a time where climate change is at the forefront of environmental issues, surfers can help to avert the possibility of disaster through awareness campaigns and active protection of the ocean.

Climate change is a fact and it is occurring right now. The *Intergovernmental Panel on Climate Change* described scientific evidence for global warming as "unequivocal." According to NASA, most of the ongoing warming is "very likely human-induced."The ocean is strongly affected by climate change. Studies have detected a warming of 0.302 degrees Fahrenheit in the top 700 meters of the ocean since 1969, and signs point to global warming of the oceans as the reason for deadlier and more frequent storms that wreak havoc on coastal communities (NASA). In addition to warming, the oceans have become more acidic due to an increase in carbon content in the water. Ocean acidification kills coral and shellfish, leading to a decrease in marine biodiversity (EPA). A study published in *Nature Climate Change* (Summers, 2013) concluded that "wave heights will increase in areas such as parts of Indonesia, the Southern Ocean and Australia's east coast, following shifts in the southern annular mode — a ring of climate variability that encircles the South Pole — and a strengthening of westerly winds in the Southern Ocean. The researchers also predict a decrease in wave height for more than one-quarter of the world's oceans, particularly in the Northern Hemisphere. The cause may be a northward shift of Pacific high pressure." Surfers in some areas will enjoy bigger waves, but the surrounding environment will suffer. Delicate reefs that create some of the cleanest waves risk being destroyed by acidification, and as sea levels rise those reefs go further underwater. Waves break

when the speed of the top section overtakes that of the lower. This is caused by the wave entering shallow water or passing over a reef, so if the reefs are deeper smaller waves break less often. All the while surfers in the Northern Hemisphere will find the waves at their home breaks are smaller, much to their disappointment. Through the ocean surfers feel the effects of climate change. This connection between surfing, its culture and the environment leads many surfers to found organizations dedicated to protecting the oceans and in doing so the sport we love.

As an act in and of itself, surfing has neither a negative nor a positive effect on the environment. A board simply is carried along by the wave's energy. This is, of course, not considering the possibility of reefs being stepped on by careless surfers, but our feet thank us for trying to avoid it as best as possible. Due to the sport's reliance on the ocean, surfers are usually environmentally caring and conscious. The *Surfrider Foundation* was founded by surfers who wanted to make a change, and has since grown into one of the largest of its kind. Its goal is to protect the ocean for the good of surfers and the rest of the world. Their beginning powerful example of surfers helping the environment: "Thirty years ago, a group of surfers from Malibu, California, were concerned about the health risks associated with environmental threats posed by escalating coastal development at their favorite surf spot. They took action. Not even they could have envisioned the history they were making when they succeeded in protecting their beloved surf spot." Although riding a wave on a surfboard doesn't help the environment, it connects individuals to the ocean and gives them a personal reason to care about its health. In the case of the *Surfrider Foundation*, that connection led several individuals to utilize their power as human beings to make changes for the better. It is often easy to imagine that the effects of issues like environmental destruction are negligible to us in our short lifetimes. Surfing brings that issue home and into the here and now, rather than a far off consequence. The efforts of individuals to protect the oceans need not be limited to local areas, either: "Since our inception in 1984, the *Surfrider Foundation* has evolved into one of the largest non-profit grassroots organizations dedicated to the protection and enjoyment of the world's ocean, waves and beaches through a powerful activist network." Beginning with protecting their home break, the *Surfrider Foundation* now addresses dangers to the ocean at large. Clearly surfing can lead people to do great things, even if it only spurs them at the beginning. The *Surfrider Foundation* also educates youths and adults about ocean conservation and protection. It has forty-eight chapters around the world and incorporates many college and high school clubs. Surfing has the power to unite people across national, linguistic and cultural borders. Through that unity we can accomplish what no individual can on their own. The *Surfrider Foundation* is not alone either. Other organizations like Save The Waves are even more directly related to surfing. Through their World Surfing Reserves program, Save The Waves "proactively identifies, designates and preserves outstanding waves, surf zones and surrounding environments around the world." The program enables surfers to turn their home break into a protected environment, blocked from harmful development like beach construction, hazardous waste and runoff from industrial plants, destruction of sand dunes and more. Recognition of a break or shoreline as a World Surfing Reserve involves several factors, including the cultural significance of the spot, presence of endangered species and potential dangers to them, economic value to the surrounding community, and that community's support for the break's protection. In helping the environment, surfers help themselves. Our dedication to keeping waves safe and fun to surf pushes the community to protect the oceans and environment. Knowing this and surf culture's eco-friendly nature, it seems both confusing and out of character that most surfboards are made with environmentally harmful petroleum-based products.

A modern polyurethane foam blank releases CO2 into the atmosphere, harmful to both shapers and the environment. Most surfboards are fiberglass which although not harmful on its own, often has heavy metals added in the shaping process that make it toxic (Sullivan, 2007). As a whole, the shaping process of most performance surfboards today is completely opposed to the majority of surfers' stance on environmental consciousness in protection. How can we preach conservation while riding an embodiment of destruction? Like most, I am guilty of riding boards whose creation is detrimental to the environment. Like most, I believe in protecting that same environment. How can surfboards, the absolute necessity required to surf, go green? The original surfboards ridden by Hawaiians were solid wood planks that took high levels of skill and strength to use. Being made from readily available wood and used by a relatively small group, they were entirely recyclable and sustainable. However as technology has progressed, so has surfboard design. The tricks and styles visible in professional surfing today would be impossible on old finless boards, most of which were between ten and sixteen feet long (Sullivan, 2007). Garnering any kind of support from the larger community for a return to grassroots surfing would most likely be impossible. As such, attention must be directed to building sustainable surfboards that are affordable and retain their performance ability.

Individual shapers and larger manufacturers are already out there developing and building performance surfboards out of eco-friendly materials. One such material is BioFoam, which uses agricultural based oil instead of the "traditional" petroleum based oils. Using BioFoam ultimately results in "36% less global warming emissions, a 61% reduction in non-renewable energy use, and a 23% reduction in total energy demand" (McMahon, N. Homeblown US, 'BioFoam' (2007). Using wood boards sealed with linseed oil instead of fiberglass also eliminates harmful byproducts from the shaping process. A survey by Sean Sullivan, a student and surfer himself, of fifty random surfers at breaks in Byron Bay, Australia found that 54% were aware of board construction's impact on the environment, and out of everyone surveyed 50% believed there should be a readily available, eco-friendly board alternative. 86% of those surveyed said they were willing to pay at $10 to $50 more for an eco-friendly board if there were the option. As part of a larger investigation, Sullivan also spoke to shapers with experience in the surf industry, all of whom were aware of the current environmental impact. In general, shapers agreed that it would be beneficial to build more durable surfboards that would last longer. However concerns were voiced that such a board would be expensive and hurt business if it were *too* durable. Shapers do benefit from the frequency of new boards required by avid surfers. The situation will not change if the surfing community does not make a change happen.

Restoring surfing to the environmentally friendly sport it originated as will require massive and concentrated effort. On the manufacturing end, shapers and the larger industry will have to dedicate money and time to changing their infrastructure. From a business point of view, this change may seem detrimental. As such, it is our responsibility as the surfers (the consumers) to force the industry to produce eco-friendly boards that cause little to no harm to the environment. This means supporting eco-friendly board manufacturers and the research required to move the field forward. If the community as a whole were willing to spend a little more on green surfboards, manufacturers whose methods are destructive would stand to lose more money than if they made the change to go green. Using our own power in the free market, we can drive the industry, kicking and screaming if need be, onto a greener path. Of course, that should hardly be necessary. Surf companies are a core part of the sport's culture and that culture is very environmentally conscious. Support for a switch to eco-friendly manufacturing simply needs to be shown so that manufacturers can feel assured that they are making a sound business decision.

Marketing, non-profit organizations and activism are all extremely helpful. But at the end of the day, "Perhaps the only incentive the average shaper needs is a customer to walk through his doors and ask them for a more environmentally friendly board" (Sullivan, 2007). We're all out there to have fun, and most shapers pick their trade for a love of surfing rather than money. Ultimately, it's up to surfers to make a change or not. But if we all choose to make a change, just imagine what we could do.

Surfing is a sport that relies on the ocean. While riding a wave I find it difficult not to feel in some way like I'm part of that environment. I imagine that all surfers feel the same in one way or another, and that feeling drives us to go surfing again. That connection makes it our duty to protect the ocean, along with anyone else that comes to the water for his or her own happiness. Organizations like the *Surfrider Foundation* and *Save the Waves* have the power to do great things, but cannot come close to the power of all the surfers in the world. Protecting the environment is a great cause that most surfers believe in regardless of their involvement with the sport. We love the ocean, and deep down don't care what we get in return for helping it. But through surfing we have built a community reliant on the ocean. That reliance, combined with a love of the ocean, can be the beginning of great and noble changes for the better. Starting with the boards beneath our feet, we can each begin to make surfing a greener sport than it's ever been before: physically safe for the environment and culturally a force for its protection. Not only can recreation and conservation coexist, in the case of surfing, recreation can be the spark that ignites support for protecting the environment. Ultimately it's up to us, the surfers, to change surfing. For our own good, and that of the world as a whole.

Bibliography

EPA (2015), Climate Change Indicators in the United States,

http://www3.epa.gov/climatechange/science/indicators/oceans/

NASA Global Climate Change (2015), Climate Change: How Do We Know?,

http://climate.nasa.gov/evidence/

NOAA Ocean Service Education (2008), Coastal Currents 1,

http://oceanservice.noaa.gov/education/kits/currents/03coastal1.html

Save the Waves Coalition:

http://www.savethewaves.org

Sullivan, S. (2007), Sustainable Surfboards,

http://www.coastalwatch.com/environment/2561/sustainable-surfboards-introduction

Summers, B. (2013), Climate Change May Bring Bigger Waves For Down Under,

Nature, 12199. Retrieved from: https://owl.english.purdue.edu/owl/resource/560/10/

Surfrider Foundation

http://www.surfrider.org/pages/mission